Overview

Using open sourced programming language(s) of your choice, please answer the below questions to the best of your ability. Please spend **no more than 5 hours is recommended**. It is not necessary that you complete all the questions, rather, this is meant for you to showcase your programming proficiency and analytical acumen.

Make sure to double check your work and follow all the submission instructions.

Submission Instructions

Once you are prepared to submit your assessment, please create a ".zip" file with the following contents:

- A **final formatted output** of your responses in either a **PDF or HTML document**. This should reflect your responses to the assessment questions. If rendering a Jupyter/Markdown document, you are encouraged to embed your code directly into the final output. Please keep in mind, your responses to the assessment questions should be clear and easy to identify.
- **All code** written to complete this assessment. Example file types to include are:

  `[".R", ".RMD", ".ipynb", ".py", ".jl", ".txt"]`

  - In your code script(s), please include a commented list of any resources you used to complete this assessment at the end of the file. For instance, Stackoverflow should be included as a resource.
  - Note, even if you embed your code directly into your final output**, you must also include your code scripts in raw form.**
- **Your updated resume.**
- **Do not** include any raw data files with your submission.

Final submission naming convention: [FirstInitial]_[LastName]_ATL2024.zip

- E.g. John Smith: J_Smith_ATL2024.zip

Submission E-mail: **hawks.careers@hawks.com**

Data Source

Your data source for this assessment will be https://www.kaggle.com/datasets/schmadam97/nba-playbyplay-data-20182019?select=NBA_PBP_2020-21.csv

- Only use data from the 2020-21 season

Assessment

Please answer the below questions to the best of your ability.

- You are encouraged to write clean, easy to comprehend, functional code.

Load data: Load the 2020-21 extended play-by-play dataset into your environment.

Part 1: Data Comprehension *(estimated time: 1.5 hours)*

(A) What does it mean for the ["ShotOutcome"] column to be blank?

(B) What is the most common assist to made basket combination for each team (a raw count). Meaning if Draymond Green assists a made basket by Steph Curry, that counts as one for the "Green → Curry" combo. Display your results in a chart or table of your choosing.

(C) Which players led the league in three shot fouls drawn in the 4th quarter? Which players led the league in and-1s in the 4th quarter? Display the top 10 players for both questions in a table or chart of your choosing.

Part 2: Analytical Acumen *(estimated time: 3.5 hours)*

Pick **one** of the below prompts to expand on:

(A) Select one team and analyze their performance in wins and losses.
   a. To select a team, filter the dataset using the "`HOME_TEAM`" and "`AWAY_TEAM`" columns.
   b. Conditional on the game result, what characteristics stand out? Calculate and examine both offensive and defensive 4 factors, team shot trends, opponent shot trends, and anything else you feel is relevant for this analysis.
   c. Based on your findings, what information would you present to the coaching and video staff? How would you present your findings? Time permitting, please include example visuals and additional research areas you would focus on in future studies.

(B) Analyzing league trends
   a. Calculate league-wide cumulative percentages for the following stats: Free Throw Percentage, Two Point Percentage, Three Point Percentage, Assist to Turnover Ratio, and Free Throw Rate.
      - You must first sort the dataset by `GAME_ID`, `WCTIMESTRING`, and `EVENTNUM`. Then calculate cumulative league-wide values for each of the stats listed above.
   b. Explore visualizing these cumulative stats. Include any visuals in your final output.
      i. What trends do you observe in these stats over time?
      ii. Which of these stats appears to stabilize quickly?
      iii. How would you formalize a study of stabilization rate?
      iv. How would you present these findings to an NBA scout? Which takeaways are the most insightful?
   c. Time permitting, create an explore additional stabilization trends. Include takeaways.